

REMARKS

The examiner is thanked for thoroughly reviewing the subject patent application. Applicants wish to point out the major features of their claimed invention, which, in a first embodiment taught in amended Claims 15, 16, 19 and 22, is a longitudinal hard bias layer over which is formed a conducting laminated lead layer wherein said layers are separated by an "interrupt" layer whose purpose is to provide a crystallographic match between said bias and lead layers. Said crystallographic match does not occur in prior art formations in which conducting lead layers are formed directly on biasing layers. The interrupt layer, which, as claimed in Claim 19, is a layer of amorphous Ta, allows an NiCr layer of an NiCr/Ru/NiCr, laminated lead layer as claimed in Claims 20 and 22, to grow with a close-packed (111) crystal plane parallel to the layer plane of its formation. This, in turn, allows the conductivity of the NiCr/Ru/NiCr lead layer to be enhanced by the specular reflection of conduction electrons within the Ru layer. The conducting lead layer thus claimed has a low sheet resistance comparable to prior art Ta/Au/Ta lead layers, but offers the additional advantages of high hardness, high melting point, corrosion resistance and resistance to oozing, smearing and nodule formation not found in Ta/Au/Ta.

In sum, the claimed invention utilizes the crystallographic orienting properties of the Ta layer to produce a specific advantageous result in a laminated conducting lead layer of NiCr/Ru/NiCr, namely that the Ru layer promotes specular reflection of conduction electrons and thereby lowers the sheet resistance of the laminate.

Applicants would now like to address Examiner's objections to the drawings, specification and the claims and Examiner's claim rejections, in the order in which they are presented and respectfully request their reconsideration.

Objections to the Drawings:

Figure 2 has been amended to show the claimed substrate, the claimed capping layer, the claimed interrupt layer and the claimed laminated conducting layer as separately numbered features. The substrate is labeled (5), the capping layer is labeled (13), the interrupt layer now appears as layer (20) and the three layers of the laminated lead layer appear as (21), (22) and (23). The amended figure is contained within a corrected sheet of drawings attached hereto.

Objections to the Specification:

The Abstract has been amended so that it properly refers to a product rather than to a method for constructing that product.

The references to "Related Patent Application" have been amended to include complete and updated information.

The first paragraphs on both pages 15 and 16 have been amended to refer to the figure reference numbers now in the amended Fig. 2.

Claim Rejections- 35 USC 112:

The preamble of independent Claim 15 has been amended to eliminate material that is already contained within the body of the claim and, thereby, to more clearly describe the invention. In addition, Claim 15 has been amended so that the sequence of layered structures comprising the claimed product are correctly claimed as being formed upon each other, as is already described within the specification.

Claims 16, 19 and 22 have been amended to eliminate claims to both a range of thicknesses and a specific preferred thickness within the same claim.

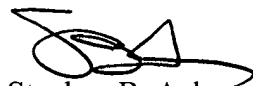
Claim Rejections Under 35 USC 103(a):

Applicants respectfully request reconsideration of the rejection, under 35 USC 103(a), of currently amended Claims 15, 16, 19 and 22, as being unpatentable over Pinarbasi (U. S. Patent No. 6,219,207) in view of Pinarbasi (U. S. Patent No. 6,219,210). Pinarbasi does not claim a laminated conducting lead layer of the form NiCr/Ru/NiCr as claimed in the present invention. It is by the use of the crystal-plane-orienting interrupt layer of the present claimed invention that such a laminate, which has exceptional hardness, high melting point, high corrosion resistance and lacks the propensity for smearing, oozing, electromigration and nodule formation. and corrosion resistance, now also acquires a high conductivity due to the enhanced specular reflection of electrons within the Ru layer in the laminate.

Examiner has suggested that claims 20 and 22, which claim this specific laminated lead layer, would be allowable if amended to incorporate the limitations of base claim 15 and to eliminate 35 USC 112 objections. Following Examiner's suggestion, the limitations of Claim 20 have been incorporated into Claim 15 and Claim 20 has been canceled. In addition, the material in Claims 17 and 18, which defined the role of the interrupt layer, has also been incorporated into Claim 15 and Claims 17 and 18 have been canceled.

The Examiner is thanked for thoroughly reviewing the application. All claims discussed above are now believed to be allowable. If the Examiner has any questions regarding the above application, please call the undersigned attorney at 845-452-5863

Respectfully submitted,



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